

OCEAN GALES AND STORMS, DECEMBER, 1936—Continued

Vessel	Voyage		Position at time of lowest barometer		Gale began December	Time of lowest barometer December	Gale ended December	Lowest barometer	Direction of wind when gale began	Direction and force of wind at time of lowest barometer	Direction of wind when gale ended	Direction and highest force of wind	Shifts of wind near time of lowest barometer
	From	To—	Latitude	Longitude									
NORTH PACIFIC OCEAN—Continued													
			° /	° /				Inches					
Chichibu Maru, Jap. M. S.	Honolulu	San Francisco	29 30 N.	145 36 W.	14	2p, 14	15	30.03	NNE	NNE, 8	NNE	NNE, 8	
Mayflower, Am. M. S.	Fishing grounds.	San Diego	13 51 N.	91 15 W.	14	6a, 14	15	29.89	NW	N, 2	N	N, 9	
Henderson, U. S. N.	Balboa	do	11 54 N.	90 18 W.	15	6p, 14	15	29.90	NE	ENE, 2	N	N, 8	ENE-NE.
H. M. Storey, Am. S. S.	do	Los Angeles	13 28 N.	91 03 W.	15	Noon, 14	15	29.79	N	NW, 1	E	N, 9	
Golden Star, Am. S. S.	Yokohama	San Francisco	42 45 N.	147 50 W.	15	6a, 16	16	29.96	W	W, 8	W	W, 9	None.
Olympia, Am. S. S.	Legaspi, P. I.	Los Angeles	41 30 N.	148 47 W.	19	Noon, 19	21	29.61	SSW	SW, 9	SW	SW, 11	S-W.
Texas, Am. S. S.	Yokohama	San Francisco	34 19 N.	139 58 E.	21	Noon, 21	21	29.89	NE	NE, 9	NE	NE, 9	
Heiyo Maru, Jap. M. S.	do	Honolulu	23 06 N.	161 21 W.	24	7p, 24	25	30.14	ENE	ENE, 7	ENE	ENE, 8	
Toorak, Br. S. S.	do	San Francisco	40 24 N.	130 44 W.	25	6a, 27	27	29.51	WNW	NNW, 6	N	NW, 9	None.
Otowan Maru, Jap. M. S.	Tokuyama	Los Angeles	35 59 N.	155 07 E.	26	4p, 27	29	29.06	SE	WSW, 8	NW	SSE, 10	SE-S-W.
Golden Sun, Am. S. S.	Yokohama	San Francisco	40 22 N.	165 33 E.	27	8a, 28	28	28.96	SSE	SW, 8	NW	S, 10	S-SW.
Empress of Japan, Br. S. S.	Honolulu	Victoria, B. C.	42 43 N.	134 59 W.	27	8a, 28	28	30.14	N	N, 7	N	NNW, 9	
Montreal Maru, Jap. S. S.	Yokohama	Los Angeles	45 53 N.	174 10 W.	27	1a, 29	29	29.27	SE	SSE, 10	WSW	SE, 10	SSE-SW.
Texas, Am. S. S.	do	San Francisco	45 42 N.	170 10 E.	28	6p, 28	29	28.83	ESE	SSE, 10	WNW	SSE, 10	SE-SW.
Hoyo Maru, Jap. M. S.	do	Los Angeles	40 55 N.	178 50 E.	28	Noon, 29	29	29.08	SSE	S, 9	NW	S, 10	S-WNW.
Texas, Am. S. S.	do	San Francisco	46 20 N.	179 00 W.	30	3p, 29	30	29.75	SSE	S, 10	S	S, 10	
Golden Sun, Am. S. S.	do	do	42 00 N.	176 40 E.	30	6p, 30	30	29.62	S	S, 9	S	S, 9	None.
Heiyo Maru, Jap. M. S.	Hilo	do	21 12 N.	153 18 W.	30	8a, 30	31	29.92	ENE	ENE, 6	ENE	ENE, 8	

* Position approximate.

NORTH PACIFIC OCEAN, DECEMBER 1936

By WILLIS E. HURD

Atmospheric pressure.—During December 1936, owing to the prevailing movement of cyclones in higher latitudes of the North Pacific, the average center of the Aleutian low lay over the Bering Sea, with the lowest recorded average pressure, 29.49 inches, at St. Paul. The lowest single barometer reading of the month was 28.44, reported by the British steamship *Empress of Russia* on the 21st, near 52° N., 147° W.

Anticyclonic conditions prevailed for the most part between approximately 20° and 40° N., except for a few days in east longitudes during which cyclones penetrated the high pressure region. Pressure departures along this belt were abnormally high, except on waters adjacent to the California coast as indicated by the average barometer at San Francisco, 30.06, which is 0.06 inch below the normal. The highest departure, +0.15, occurred at Midway Island. In the Far East the plus departures of 0.11 inch at Naha and of 0.09 at Chichishima attest to the prevalence of anticyclones from China as dominating the weather conditions in lower Japanese and eastern Chinese waters.

TABLE 1.—Averages, departures, and extremes of atmospheric pressure at sea level, North Pacific Ocean, December 1936, at selected stations

Stations	Average pressure	Departure from normal	Highest	Date	Lowest	Date
	Inches	Inch	Inches		Inches	
Point Barrow	29.84	-0.19	30.60	2	29.10	30
Dutch Harbor	29.59	+0.03	30.24	25	28.74	9
St. Paul	29.49	-0.09	30.06	25	28.74	9
Kodiak	29.58	+0.02	30.40	29	28.68	9
Juneau	29.70	-0.09	30.34	31	28.87	16
Tatoosh Island	29.94	-0.02	30.59	10	29.42	26
San Francisco	30.06	-0.06	30.43	17	29.56	30
Mazatlan	29.93	0.00	30.04	20	29.86	8, 11, 30
Honolulu	30.04	+0.03	30.22	15	29.84	4
Midway Island	30.16	+0.15	30.40	17	29.88	25
Guam	29.84	-0.03	29.92	7, 10, 11	29.56	15
Manila	29.84	-0.02	29.94	11, 12	29.74	24
Hong Kong	30.06		30.17	13	29.97	16
Naha	30.09	+0.11	30.30	15	29.74	4
Chichishima	30.09	+0.09	30.36	15	29.71	26
Urakawa	30.00		30.59	15	29.68	31

NOTE.—Data based on 1 daily observation only, except those for Juneau, Tatoosh Island, San Francisco, and Honolulu, which are based on 2 observations. Departures are computed from best available normals related to time of observation.

Storminess and gales.—December was less violently stormy in 1936, according to ship reports, than the preceding month. In November there were 9 days on which gales of force 11 to 12, well scattered as to locality, occurred; in December there were only 2, one reported by the British Steamship *Irisbank*, near 52½° N., 159° W. on the 12th; the other by the American Steamship *Olympia*, in 41°31' N., 148°47' W., on the 19th. There were, in addition, 9 days—the 5th, 8th to 10th, 14th, and 27th to 30th—with local gales of force 10, occurring principally along the northern routes between longitudes 155° E. and 145° W., as itemized in the accompanying table of gales.

Extratropical cyclones.—The majority of the December cyclones, as they appear on our North Pacific maps, were of purely oceanic nature. That is, they were largely the fluctuating disturbances, some of considerable depth, of the type peculiar to the Aleutian low. This month these cyclones had their centers mostly in high latitudes and, except on the western part of the ocean, affected the weather south of the fortieth parallel to only a minor degree.

Eastward from Yokohama fresh to strong gales were experienced by ships near the coast on the 12th and 21st. Between 150° and 165° E., 34° and 38° N., gales of force 8 to 10 were reported on the 3d, 4th, 8th, 9th, and 27th. Of these dates, the 8th and 9th were more generally widespread in storminess than any others of the month as, in addition to the more southerly locality of storm occurrence, those dates were also locally stormy to the northward, northeastward as far as the Aleutian Islands, and eastward along the northern routes as far as longitude 155° W. On the 9th the island stations of St. Paul, Dutch Harbor, and Kodiak had their lowest barometer readings of the month as noted in table 1.

During the period 13th–18th storminess abated along the northern routes, although scattered gales were reported in middle longitudes on the 14th to 16th.

On the 19th–21st disturbed conditions intensified between the Gulf of Alaska and the fortieth parallel. In the southern part of the area on the 19th the Steamship *Olympia*, as previously mentioned, encountered a gale of storm force, one of the two heaviest gales of the month, but with lowest barometer only 29.61. On the 20th, between 45° and 51° N., 140° and 145° W., pressure had fallen to 28.76 inches, with fresh westerly gales

occurring. On the 21st with the lowest pressure of the month, 28.44 inches, reported by the British Steamship *Empress of Russia* near 52° N., 147° W., the highest wind force recorded for the stormy area was 8. The cyclone filled rapidly on the following day.

Stormy weather occurred on California coastal waters during the 26th to 28th. Ships reported strong gales on the 26th and 27th between 40°-43° N., 130°-135° W. Nearer the coast, press reports speak of the heaviest storm in years on the 27th along southern California during which several small vessels were grounded and damaged or sunk.

The final days of the month witnessed scattered gales over northern and western waters with reports of isolated winds of force as high as 10 on the 27th to 30th.

Gales of low latitudes.—On December 4 a tropical depression moved northward over the Hawaiian Islands.

During its brief existence to the southward of a strong anticyclone, it caused intensification of the trade winds northeast of the islands. On the 5th to 8th, midway along the route from Honolulu to Balboa strong northeast trades, force 7-8, were encountered by the American Steamship *Steel Age*.

In the Gulf of Tehuantepec norther gales occurred as follows: of force 7 on the 23d and 24th; of force 9 on the 14th and 15th.

Reports from Manila indicate the existence of a damaging typhoon over the central Philippines on December 2.

Fog.—Ships reported fog on 6 days in December—on 1 day near San Diego, Calif., and on the other days in widely separated localities along the upper and middle steamship routes.

CLIMATOLOGICAL TABLES

CONDENSED CLIMATOLOGICAL SUMMARY

In the following table are given for the various sections of the climatological service of the Weather Bureau the monthly average temperature and total rainfall; the stations reporting the highest and lowest temperatures, with dates of occurrence; the stations reporting the greatest and least total precipitation; and other data as indicated by the several headings.

The mean temperature for each section, the highest and lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperatures and precipitation are based only on records from stations that have 10 or more years of observations. Of course, the number of such records is smaller than the total number of stations.

Condensed climatological summary of temperature and precipitation by sections, December 1936

[For description of tables and charts, see REVIEW, January, p. 29]

Section	Temperature						Precipitation					
	Section average	Departure from the normal	Monthly extremes				Section average	Departure from the normal	Greatest monthly		Least monthly	
			Station	Highest	Date	Station	Lowest	Date	Station	Amount	Station	Amount
Alabama.....	50.3	+2.8	Pushmataha.....	80	6	Riverton.....	18	13	Centerville.....	11.55	Newton.....	3.89
Arizona.....	44.9	+7	Florence.....	84	22	St. Johns.....	-5	31	Williams.....	6.16	Yuma Valley.....	T
Arkansas.....	45.5	+2.8	Magnolia.....	78	30	Gilbert.....	13	12	Yancopin.....	9.31	Lead Hill.....	2.14
California.....	44.2	-1.3	2 stations.....	82	14	Bridgeport.....	-19	29	Squirrel Inn.....	21.44	Tule Lake.....	.14
Colorado.....	28.6	+3.1	Meeker (near).....	72	17	Hermit (near).....	-23	27	Pagosa Springs (near).....	10.30	3 stations.....	T
Florida.....	61.7	+1.9	2 stations.....	89	6	Cottage Hill.....	26	20	Garniers (near).....	7.45	Everglades.....	.18
Georgia.....	49.7	+2.0	Fargo.....	83	31	2 stations.....	18	11	Cornelia.....	12.00	Fitzgerald.....	2.80
Idaho.....	28.5	+2.5	Lapwai.....	65	19	Deadwood Dam.....	-24	31	Roland.....	9.59	Indian Cove.....	.06
Illinois.....	35.1	+4.6	Jacksonville.....	67	25	Freeport.....	-13	7	Wheaton.....	4.32	Keithsburg.....	1.52
Indiana.....	35.5	+3.3	Shoals.....	74	30	3 stations.....	0	7	La Porte.....	4.81	Farmersburg.....	1.05
Iowa.....	28.7	+4.7	Keosauqua.....	65	25	Rock Rapids.....	-16	7	Muscatine.....	2.94	Waukon.....	.61
Kansas.....	37.7	+4.8	Valley Falls.....	69	25	2 stations.....	-1	12	Eureka.....	4.05	Smith Center.....	.08
Kentucky.....	40.5	+2.8	Cumberland.....	70	29	Mammoth Cave.....	10	13	Mammoth Cave.....	7.26	Grant.....	1.77
Louisiana.....	53.4	+1.0	2 stations.....	82	6	Ruston.....	21	13	Angola.....	11.79	Burrwood.....	2.36
Maryland-Delaware.....	37.6	+1.9	do.....	70	27	Oakland, Md.....	-10	23	Lutherville, Md.....	8.10	Oakland, Md.....	3.68
Michigan.....	28.7	+3.0	Kalamazoo.....	69	30	2 stations.....	-22	7	East Jordan.....	4.49	St. Ignace.....	.52
Minnesota.....	17.7	+2.2	2 stations.....	57	26	Pokegama Falls.....	-42	7	Pigeon River Bridge.....	3.90	Angus.....	.21
Mississippi.....	49.8	+1.5	do.....	80	6	2 stations.....	20	13	Waynesboro.....	10.28	Biloxi.....	3.72
Missouri.....	38.4	+4.3	do.....	69	24	Grant City.....	-7	7	Dexter.....	6.29	Meramee Park.....	1.06
Montana.....	23.4	+4	Simpson (near).....	68	19	Outlook.....	-41	6	Heron.....	7.27	Deer Lodge.....	.11
Nebraska.....	29.8	+3.0	Syracuse.....	69	25	Merriman.....	-17	6	Falls City.....	2.00	Waterloo.....	.02
Nevada.....	52.4	+1.6	Logandale.....	70	23	San Jacinto.....	-10	29	Marlette Lake.....	7.27	Thorne.....	.26
New England.....	29.5	+3.0	2 stations.....	62	31	First Conn. Lake, N. H.....	-20	8	Kingston, R. I.....	11.59	Burlington, Vt.....	2.20
New Jersey.....	37.5	+3.8	Charlotteburg.....	67	26	Layton.....	-3	1	Long Branch.....	8.87	Little Falls.....	2.73
New Mexico.....	35.3	+1.4	Hagerman.....	78	9	Lee Ranch.....	-24	18	McGaffey Ranger Station.....	3.97	Hagerman.....	.00
New York.....	30.5	+3.8	Bedford Hills.....	66	126	Stillwater Reservoir.....	-31	1	Bridgehampton.....	9.81	Penn Yan.....	.86
North Carolina.....	44.6	+2.0	3 stations.....	75	11	Mount Mitchell.....	8	20	Swansboro.....	14.80	Montreat.....	3.38
North Dakota.....	15.0	+2.3	Mott.....	59	23	Willow City.....	-36	30	Fullerton.....	1.23	Carrington.....	T
Ohio.....	35.4	+3.8	Portsmouth.....	68	27	Jefferson.....	-1	1	Peebles.....	4.53	2 stations.....	1.12
Oklahoma.....	44.1	+4.3	Spavinaw.....	73	28	Goodwell.....	4	3	Smithville.....	5.07	Kenton.....	.14
Oregon.....	34.3	+1.0	Arlington.....	68	23	Austin.....	-15	1	Valsetz.....	23.30	Owyhee Dam.....	.03
Pennsylvania.....	34.5	+3.2	Marcus Hook.....	74	25	Emporium.....	-11	1	Phoenixville.....	7.15	Erie.....	1.19
South Carolina.....	47.6	+1.0	Orangeburg.....	78	26	Chester.....	19	21	Caesars Head.....	13.30	Charleston.....	2.99
South Dakota.....	22.7	+1.9	Vale.....	68	22	Lemmon.....	-27	6	Sioux Falls.....	1.81	Strool.....	T
Tennessee.....	43.8	+3.1	Madisonville.....	75	29	Dover.....	11	12	Madisonville.....	9.54	Elizabethton.....	2.85

1 Other dates also.